Accounting for Tax Subsidies With Special Reference to Cost of Service, or "Fair Rate of Return", Utility Regulation

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Introduction

The prices of goods and services exchanged voluntarily in markets, when there are no barriers to entry, tend to approximate "cost of production." Conventionally, cost of production comprises two elements, payments for labor services and materials embodied in the goods and services produced for sale and payments for the services of capital--plant, equipment, inventories, etc.--similarly embodied in the output. In the unregulated sector, where freedom of entry and exit by individual enterprises is presumed to exist, prices "automatically" equilibrate with costs: if a seller receives prices in excess of labor, material and normal capital costs, his abnormal return, conventionally expressed as a return to his equity capital, attracts competition; if the prices he receives fall short of his total costs, he exits. In the regulated sector, where it is presumed that technological conditions preclude freedom of entry and exit, regulatory commissions function to equilibrate prices and costs.1/

1/ Another function performed in unregulated markets is the assurance that the costs of production to which prices are equilibrated are minima. Since markets for labor and capital both function to allocate these resources to employments in which the value product is a maximum, it follows that least-cost technologies will tend to be employed. Neither workers nor capital owners will accept returns for productive services that are lower than might be earned elsewhere either because the products they produce fail to fetch sufficiently high prices or because the technology being employed is obsolete. In the case of regulated industries, it is presumed the regulators will exercise vigilance to ensure that prices received are no higher than costs, and that the costs are as low as technology permits.

Because regulatory agencies must replace impersonal market forces in establishing both quality of service and schedules of allowable maximum rates to be charged for services, their responsibilities are varied and complex. Given a specification of "quality of service", the "cost of service" must be measured so that revenues generated by the schedule of allowable rates will not be "excessive." To carry out this responsibility, regulatory commissions establish procedures by which the varied transactions of regulated companies are recorded so that the outcome of the operations of the companies may be reviewed and made subject to control by the commissions.

An understanding of these standard procedures, commonly known as standard accounts, is critical to an understanding of the logically consistent way in which tax subsidies should be accounted for, in both the regulated and unregulated sector of the economy. Therefore, the first section of this paper sets out the elements of an accounting system, and defines the terms relevant to an accounting for "cost of service" and for the subsidies which affect this cost. The next section introduces a capital grant subsidy, the class to which the investment tax credit belongs, and demonstrates how this public support of capital formation operates to reduce the "cost of service." The following section introduces a capital subsidy in the form of an "interest-free loan," the class to which "artificially accelerated tax depreciation" allowances belong, and contrasts this with a capital grant form of subsidy. The subsidy accounting procedure commonly called "normalization" is shown to be the only technique that correctly portrays the intended effect of both capital subsidies on the cost of service. The fourth section demonstrates that "normalization" accounting also effectively portrays the results of capital subsidies under dynamic conditions; the last section comments on the extension of these subsidy accounting techniques to the unregulated sector.

Although the perspective of this paper emphasizes private firms' accounting for certain capital subsidies, the rules it derives are also fully applicable to both social accounting and Federal budget accounting. The private sector transactions that constitute the raw materials assembled by accounting rules at the firm level are also the raw materials assembled by the Commerce Department in its preparation of the National Income and Products Accounts (NIPA) and the base for Federal and other governments' tax systems. Similarly, the private claims against stocks of capital and the related claims to product flows recorded in private accounting systems are also legal property rights which should be duly observed in the construction of the NIPA and in the presentation of governments' financial claims against, and obligations to, the private sector shown in budgets. As a matter of fact, the treatment of the subsidies discussed below in the NIPA and their presentation in government budgets does not follow the rules derived from an analysis of the economic effects of these subsidies. Instead, the NIPA and government budget apply rules which are shown below to misrepresent the effects of subsidies cleared through the tax system; that is, the NIPA and budgets treat such subsidies as "reductions in tax", not as payments for the performance of acts Congress and other legislatures have deemed worthy of compensation. The consequences of this asymmetrical treatment of subsidies paid, or cleared, through the tax system in both the NIPA and government budgets, however, is a subject beyond the scope of this paper. Identification and measurement of these consequences is an object of continuing research within the Office of Tax Analysis to be reported in future OTA Papers.

Finally, there is another purpose served by the analysis of tax subsidies presented below that should be noted. The subsidies examined, the investment tax credit and artificially accelerated tax depreciation allowances, both relate

to the acquisition and use of capital goods. Since the early work of Robert Hall and Dale Jorgenson,2/ econometric models of investment behavior commonly have incorporated a variable called "rental cost of capital" as one of the determinants of investment outlays; and the terms on which capital income is taxed is, in turn, among the significant determinants of "rental cost of capital." For many, an understanding of the content of "rental cost of capital" has been impeded by its mathematical presentation and liberal use of discounting. In this paper, the "rental cost of capital" is simply called "cost of capital services" the content of which may be grasped with the aid only of simple arithmetic; and, without resort to discounting, the reader may see how subsidies affect rental cost and the "incentive to invest." Other readers, familiar with the econometric uses of rental cost of capital may detect in the analysis of subsidies that follows an implicit criticism of the way the two kinds of subsidies are specified in econometric models. But this is also a matter beyond the scope of this paper.

I. Accounting for the "cost of service."

Three classes of transactions

Any enterprise, whether regulated or unregulated, engages in a myriad of transactions involving the employment of labor, procurement of materials, the acquisition and maintenance of plant and equipment, and the payment of taxes in the course of producing and selling goods. Organizing these transactions in a structure that is both comprehensive

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2/ Hall, R.E. and Jorgenson, D.W., "Tax Policy and Investment Behavior", American Economic Review, LVII (June 1, 1967), pp. 391-414.

and analytically useful is the subject matter of accounting, both for financial reporting and income tax compliance. Three sets of transactions must be dealt with: First those involving the purchases of goods and services which are directly embodied in the goods and services sold within an accounting period, usually a year. In principle, purchase transactions are cumulated, or "inventoried" over the course of the year and subtracted from the sales transactions as "cost of goods sold"; the excess of sales proceeds over cost of goods sold is "operating income" of the enterprise.

The second set of transactions to be dealt with are those pertaining to the acquisition and use of plant and equipment items, the services of which are embodied in the enterprise output over a long span of accounting periods. For this class of transactions, in addition to accounting for acquisition of the assets encompassed in market exchanges, it is also necessary to account for the using-up of these assets; and since this cost of output is normally not observable in a set of market transactions, a procedure for imputing the value of the capital consumed during a period is required.

Finally, there is the class of transactions concerned with financing operations, particularly the acquisition of plant and equipment items. These include the extension of trade credit to finance sales, the receipt of trade credit to finance purchases, and the issuance of long-term debt instruments or issuance of stock to obtain additional equity. Unlike the other two sets of transactions which are concerned with measuring the cost of producing goods and services for sale, and the net outcome of an enterprise's economic activity, these transactions involve only the recording and assignment of claims against the assets of the enterprise.

Assumptions underlying the base case.

We will not concern outselves here with the problems of maintaining surveillance over the classifications of transactions in order to derive reliable measures of income, whether for financial or tax purposes. This is a tremendous burden of auditing borne by regulatory, financial, and income tax personnel which we will assume is satisfactorily accomplished in the real world. Instead, we will concentrate our attention on the statements which summarize the outcome of accounting for the economic performance of an enterprise.

To do this most expeditiously, and to facilitate the later discussion of accounting for the introduction of tax subsidies, we will make the following simplifying assumptions:

(1) The enterprise, a regulated utility, has financed its operations in such a way that its "current assets" equal its "current liabilities." That is, the amount of its cash on hand, accounts receivable, and inventories of materials and supplies is exactly equal to its accounts payable (including accrued taxes). This means that the net value of its plant and equipment is eactly equal to outstanding interest-bearing debt and the claims of its equity, or share, owners. Plant and equipment is therefore the "rate base." More generally "rate base" includes such assets as inventories, land and other "nondepreciable" assets that are employed in an enterprise and which are also financed by debt and equity.

(2) All plant and equipment is depreciable.

(3) The acquisition cost of plant and equipment is the same for both regulatory (financial) and tax accounting purposes.

(4) The regulatory life of plant and equipment is 30 years; and the total plant and equipment account is comprised of 30 equal units, one of which must be replaced each year.

(5) There is no growth and no inflation; the state of technology does not change.

(6) Sixty percent of the rate base is financed by debt, 40 percent by equity; the interest payable to bondholders is 10 percent, the after-corporate-tax return to equity is 15 percent.

(7) All interest is paid at the end of the year; corporate income after taxes is also distributed at that time.

(8) Plant and equipment acquisitions are made at the beginning of each year.

These assumptions generally define the case of a "going concern" in what is technically described as "stationary equilibrium." However, as will be noted below, this model of an enterprise may also be used to describe dynamic adjustment to changes in the size of the enterprise or in the terms on which its assets are acquired or financed.

Description of the "base case."

In the base case, we assume that income tax accounting perfectly matches regulatory accounting, and there are no

subsidies. Then, for the year 1979, Table 1 shows the income statement summarizing the first two classes of transactions noted above. Sales of utility services aggregated $274.6 million, of which $165 million (60 percent of sales) consisted in cost of goods sold, leaving an operating income of $109.6 million. This operating income is allocable into $30 million for depreciation, $27.9 million paid in interest, $23.8 million in corporation income tax, and an after-corporate-tax return to shareholders of $27.9 million. Operating income is therefore no more, or less, than the capital cost portion (40 percent in this example) of total cost and sales: it includes provision for recovery of capital consumed during the year, a return to bondholders, corporation income tax--a tax on the income attributable to equity capital, the incomes attributable to labor, suppliers, and creditors having been allocated to them--and a return to shareholders. The 40 percent of total cost (sales) allocable to capital is approximately typical of electric utilities.

Since we are assuming that interest and shareholder earnings are paid out at year end, the beginning and ending balance sheet, summarizing the third class of transactions dealing with claims against the assets, also in Table 1, shows that, net, no change in total assets or claims against them have occurred.

On the asset side, cash and other current accounts are up by $30 million, representing the cash-flow resulting from the allowance for 1979 depreciation included in cost of service (sales); but net plant and equipment has been reduced by that same $30 million. As claims against the total of $565 million of assets, current liabilities remain at $100, and the $465 million of plant and equipment continues to be financed by $279 million in long-term debt, the basis for an interest charge of $27.9 million, at 10 percent, and by $186 million of shareholder equity, the basis for an after-corporate-tax return of $27.9 million.

If we assume there are 10 million shares outstanding, they will sell at $18.60 a share, for they will receive $2.79 a year in dividends, a 15 percent return, which is sufficient to warrant their being held, under the assumption we are operating with. So long as the prices of utility services yield $274.6 million in total revenue, and costs, including market rates of return to capital, remain unchanged, the combined return to capital of $55.8 million, representing a 12 percent return to the $465 million of privately furnished funds to operate the utility, is a "fair return" and the 12 percent a "fair rate of return."

In fair rate of return regulation, then, a regulatory commission forecasts the net plant and equipment (rate base) that will be required to furnish a postulated quantity of service, multiplies this by the "fair rate of return", adds to this an income tax quantity which is functionally determined by the equity return, and finally adds to this estimate of the cost of capital services a forecast of labor, fuel, and materials costs of production. This forecast total cost of service becomes the required sales revenue, and given a forecast of the service produced and distributed, rates per unit of services fall-out. This is "cost of service" utility regulation, including a "fair rate of return", on rate base.

Thus viewed, cost of service rate regulation is consistent with any structure of rates that will yield the necessary sales revenues, i.e., with "marginal cost," time-of-day or year, fixed charge plus price per unit consumed, etc., pricing policies. Obviously, different pricing strategies will result in different quantities demanded and different rate bases. Thus, in what follows, the capacity taken as given presumes some structure of rates by which customers are charged for their consumption of service. This rate structure may, or may not, be optimal or be fair in any particular sense; it is only required to produce a flow of revenues sufficient to yield a "fair rate of return."

A note on the base case replacement of plant and equipment.

By our assumptions of no growth, inflation, or change in state of technology, it follows that each year our illustrative company will have to acquire $30 million of plant and equipment items in order to maintain its service capacity at unchanged prices (and cost of service). Thus at the beginning of 1980 (end of 1979), the illustrative utility will have to buy $30 million of replacement capital goods. Therefore, at the beginning of 1980, the $30 million increment of cash and other current assets accumulated during 1979 is exchanged for the plant and equipment, and the balance sheet reverts to its beginning-of-1979 appearance. Under plant and equipment, $30 million of assets that had been acquired in 1950 are removed from the account and are replaced by $30 million of new items. Similarly, the $30 million of accrued depreciation with respect to the 1950-vintage assets is removed from the accrued depreciation account; this restores the net plant and equipment account to $465 million, the rate base required to produce the utility company services for 1980.

Table 2 may be helpful in comprehending the process of maintaining a capital stock. There a partial array of each vintage of assets in service at the beginning of 1979 is shown. Under the regulatory rules for measuring cost of service, each vintage is "depreciated" 1/30th each year; an imputation method called "straight-line." Thus, at the beginning of 1979, the 1950 vintage, the oldest in use during 1979, has a net book-value of $1 million, $29 million having been recovered in costs of service over the prior 29 years of its use, whereas the 1979 vintage, being just acquired has a net book-value of $30 million. Altogether, of the original acquisition cost of $900 million, $435 million has been recovered by the private suppliers of financial capital, leaving a net rate base of $465 million.

At the beginning of 1980, the 1950 vintage drops out, its position at a $1 million net book-value being assumed by the 1951 vintage; likewise, the 1979 vintage eases down a notch to a net book-value of $29 million, being replaced by the new 1980 vintage with a net book-value of $30 million. Thus, at the beginning of 1980, the original cost of all 30 vintages in use is still $900 million, of which $435 million has been recovered in depreciation charges embedded in the cost of service for years prior to 1980.

A note on the meaning of net book-value.

Clearly, the allowance for depreciation is an imputation of the decline in value of depreciable assets. In the regulated company case, since regulatory commissions establish rates based on their rule for imputing depreciation, so long as the fair rate of return applied to the rate base (original cost less previously imputed depreciation) matches the opportunity cost of financial capital for the utility, the market value of stock will equal the book-value of that stock. That is, the regulatory commission's valuation of plant and equipment, $465 million, less the claims of bondholders, $279 million, equals the book-value of equity. Then book-value is the market value of plant and equipment as well; by its ratemaking power the commission establishes a market value of regulated company plant. In the unregulated sector, however, where firms lack the power to exclude competitors and hence, are powerless to maintain prices to assure capital suppliers their opportunity cost rates of return, book-values of assets and shares do not normally equal market values. This is a point to which we will return in Section IV.

For what follows, the normal equality between book and market values of regulated companies, is a critical point. Regardless of the "quality" of regulatory ratemaking rules,

commission rules for imputing depreciation as a cost of service must be taken as the "norm" against which tax depreciation rules will be compared. For example, it might be demonstrated that, if utility commissions tried harder to account for obsolescence due to technical change in production and distribution facilities used by the utility and/or to changes in the relative costs of fuels or other inputs used, they would find a set of depreciation imputation rules other than straight-line more realistic. Applying these more realistic rules would permit more timely introduction of improved plant and equipment, and these "better" depreciation imputation rules would ultimately result in a lower total cost of service as more efficient combinations of labor and materials were thereby put into use.3/ But, since the logic of fair rate of return price setting validates whatever depreciation imputation rule that is used by a regulatory commission, whether the rule is optimal or not; it is the norm to measure income of the regulated company, both for financial and tax accounting purposes.

II. Accounting for a subsidy for the acquisition of capital

So long as a replacement module costs $30 million and the entire $30 million must be financed with funds obtained in private capital markets, the capital portion of cost of service will be $109.6 million in the example we have postulated as the base case. During 1979, 1980, and every succeeding year, this cost of service will recur and have to be recovered in the charges permitted the regulated company.

3/ The FCC staff has recently suggested that depreciation imputation rules used by that agency may have retarded technical progress and cost reduction in the telecommunications industry. Virtually every investigation of depreciation patterns for machinery and equipment has concluded that "straight-line" patterns are poor approximations for asset value decline, the phenomenon depreciation is supposed to describe.

Let us now examine the consequence of a 10 percent subsidy for the purchase of depreciable property, when tax accounting rules match regulatory accounting rules.4/ Since the

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4/ Those familiar with the analysis of excise taxes and subsidies will be aware that whether the subsidy is conferred on the purchaser, or the seller of a commodity, the net effect will be the same. If the subsidy is given to the seller, and if entry into the production of the subsidized article is free, selling prices will be competed down by the amount of the subsidy. If the subsidy is given to the buyer, offer prices will be bid up by the amount of the subsidy. But, if the article in question can be produced at constant prices, then the selling price (net to the producer) cannot be more than the cost of production, and the whole amount of the subsidy will be "passed through" to buyers in the form of lower net purchase prices. The government will be paying that fraction of the cost represented by the subsidy; buyers will be paying for the remainder with their own disposable resources.

In the present case, a subsidy for the purchase or sale of capital goods, a subsidy paid to the buyer rather than the seller is preferable on administrative grounds. Whether a "qualified" article is a capital good or not depends on the use to which a buyer will put it. A vehicle used by the purchaser in a productive enterprise ("trade or business") is obviously a capital good; the same vehicle used for recreation or personal transportation is not. Since qualification of an article for a capital subsidy can be more easily determined after its purchase by whether the purchaser must "capitalize" the acquisition cost and recover his capital through depreciation imputations as he uses it to produce salable output, it is more convenient to pay a capital subsidy to the purchaser.

"proper" regulatory accounting rules for a form of this subsidy conveyed as a credit against income tax otherwise due is the subject of controversy, we shall here simply develop the "regulatory rule" that reflects the logic of cost of service, or fair rate of return, utility rate regulation. As will become apparent, this rule for accounting for a subsidy is generally that called "normalization."

A cash subsidy for the purchase of qualified property.

Suppose that, effective January 1, 1979, Congress authorizes the Secretary of Commerce to pay each purchaser of depreciable property with an expected life of 7 or more years, on the submission of evidence that such property has been acquired, an amount equal to 10 percent of the purchase price of the property. Since the regulated company buys and uses depreciable property with an expected life of more than 7 years, its 1979 purchase of $30 million will be eligible for the subsidy when company officials duly present invoices or contracts and similar documentation of the purchase. As was shown in Table 1, in any year, the result of the regulated company's operations was to increase its cash and other current assets by $30 million which was then available to acquire that amount of replacement items for its plant and equipment account. Thus, at the end of 1978, the company had $30 million, amassed as a recovery of capital consumed during 1978 from its sales revenue, with which to buy property that would now only cost it $27 million, net of the cash contribution of the Commerce Department.

The remaining $3 million of cash and other current assets at the beginning of 1979 is now redundant for maintaining the constant stock of company plant and equipment. The $3 million excess therefore should be used to reduce debt and outstanding equity so that utility customers will not be

burdened with providing a return to the now displaced private financing; customers should pay only for returns to privately financed capital used to produce the output they buy. Since there is no reason to alter the debt-equity ratio of the company, $1.8 million of outstanding bonds will be retired along with $1.2 million of shareholder equity. The bonds may be retired either by not "rolling over" that amount of debt maturing on January 1, 1979, or by buying back that amount of outstanding bonds. Similarly, the $1.2 million of redundant equity might be paid back as a "return of capital" to all existing share-holders, or $1.2 million of outstanding stock might be purchased in the market and cancelled.

The effect on net rate base of the utility therefore has been a reduction of $3 million at the beginning of 1979 as compared with the pre-subsidy case discussed above: total net acquisition cost of the property is now $897 million because the 1979 vintage cost only $27 million rather than $30 million, while accumulated depreciation is still $435 million, leaving a net rate base of $462 million rather than $465 million; and this reduced rate base is financed with $277.2 million of debt, and $184.8 million of shareholder equity.

The subsidy also has two effects on the cost of service for 1979. First, only $0.9 million of depreciation, recovery of private capital, need be provided for the 1979 vintage addition to the capital stock. Thus, since the other 29 vintages in use during the year each require $1 million, the total depreciation charge entered into cost of service for 1979 need only be $29.9 million instead of $30 million. Second, interest paid bond holders is reduced to $27.72 million and the after-corporate-tax return to equity is also reduced to $27.72 million. The reduction in required return to equity has a related effect on the Federal income tax.

Altogether, the cost of service will have been reduced by virtue of the subsidy in 1979, assuming the regulatory authority acts promptly to reflect the subsidy in the rate charges it approves.

But before tracing the net effect of the subsidy in 1979 and future years as each additional replacement vintage benefits from the 10 percent subsidy, an accounting convention needs to be introduced and explained. Because the market price of the equipment items acquired in 1979 is still $30 million, accountants feel constrained to show $30 million as the acquisition cost in balance sheets. But, since $3 million was contributed by government subsidy, they initially offset the $30 million by a $3 million account labelled "unamortized subsidy". Thus, at the beginning of 1979, the balance sheet entry for the 1979 vintage, in isolation, would be:

Plant and equipment (beginning of 1979):

Acquisition cost		$30
less: Unamortized subsidy	$3	
Accrued depreciation	0	3
Net rate base		$27

For the 1979 vintage, still in isolation, the end of 1979 balance sheet entry would be:

Plant and equipment (end of 1979):

Acquisition cost		$30
less: Unamortized subsidy	$2.9	
Accrued depreciation	1.0	3.9
Net rate base		$26.1

In effect, this esoteric accounting treatment, in which the subsidy is amortized over the life of the property, shows the net book-value of the subsidized asset at private cost. Also under this accounting treatment, while the $30 million is apparently "depreciated" over 30 years, this is offset by annual amortization of the subsidy so that the net reduction in book-value, at private cost is, in fact, $0.9 million, 1/30th of the $27 million. "Net depreciation" of subsidized assets entering cost of service is of private cost only.

With this in mind, we may now assemble the 1979 financial statements incorporating the cost of service impact of the $3 million capital subsidy received with respect to the 1979 vintage of capital; these are shown in Table 3. Instead of the base case required total revenue of $274.57 million, after one vintage of capital has been subsidized, the required revenue shrinks to $273.95 million. This saving to utility customers of $0.62 million in 1979 results from the following reductions:

Private capital recovery	$0.10 million
Interest payment	$0.18 million
Federal tax	$0.16 million
Return to equity	$0.18 million
Total	$0.62 million

We have already noted the reduction in rate base, from $465 to $462 million, at the beginning of 1979, also shown in the beginning and end of year balance sheets in Table 3. It will be observed that, at the end of 1979, the book-value of plant and equipment has diminished by only $29.9 million, for the "depreciation" of the $30 million market price of the 1979 vintage is offset by a $0.1 million reduction in unamortized subsidy. By the same token, cash and other current assets have increased by only $29.9 million, instead of

$30 million as in the base case because only this amount of cash-flow has been provided in the reduced cost of service charges.

Thus, at the beginning of 1980, after one year of operation under the subsidy, the regulated company has $29.9 million to finance the acquisition of a new vintage of equipment items. Again, with a 10 percent cash subsidy, the market price of $30 million will require only a $27 million drain on the company's cash resources. Thus, at the beginning of 1980, $2.9 million of excess private debt and equity develops, resulting in a retirement of $1.74 million of debt and $1.16 million of shareholder equity. For the year 1980, cost of service will be further reduced, and the process of reducing annual net (of subsidy amortization) charges for depreciation and returns to creditors and equity holders will continue until all 30 vintages have been replaced by property subsidized by the Commerce Department. The annual net rate base, total revenue required, and cost of service elements comprising the revenue requirement 1979 to 2009, are arrayed in Table 4. Each year, a little more of the privately financed net rate base is displaced by public subsidy so that, by 2008, the net rate base has shrunk by $46.5 million from its unsubsidized level of $465 million; since the capital subsidy is 10 percent, so long as the subsidy remains in effect for at least thirty years, 10 percent of privately financed capital in a regulated company will be replaced by publicly financed capital.

Taxpayers generally will assume the cost of maintaining 10 percent of the qualified capital stock, and since they do not require a return for supplying this capital used in the private sector, for both these reasons the capital cost portion of total cost of service shrinks by 10 percent. In the year 2008, gross revenues need cover only $27 million of

the cost of $30 million of equipment items required to maintain the company's capital stock; the other $3 million is supplied by Federal taxpayers through the Department of Commerce. Interest coverage in sales revenue becomes $25.11 million, as does the after-corporate-tax return to shareholders, 10 percent less than the unsubsidized levels of $27.9 million. Finally, the Federal income tax coverage in revenues becomes $21.39 million, also 10 percent less than the base case level of $23.77 million. Because capital costs comprise 40 percent of the base case total cost of service, the subsidy induced 10 percent reduction of capital cost of service becomes a 4 percent reduction in total cost of service; in 2008, customers would need to pay only $263.61 million for the capital-subsidy-assisted output of a plant costing $30 million in resources annually to maintain instead of $274.57 million.

The importance of correctly accounting for a capital subsidy.

The foregoing step-by-step analysis of a procedure for accounting for a capital subsidy has an inherent economic logic worth exploring. As noted earlier, the function of an accounting system is to portray the outcome of transactions, economic decisions, involved in the production and sale of goods and services. The names one attaches to the procedures, or to the transactions, are unimportant; rather, the test of validity of the accounting procedures is whether they produce accurate measures of underlying phenomena.

To demonstrate that the foregoing procedure, popularly called "normalization," is the only acceptable way to account for a capital subsidy, because it alone provides an accurate measure of the underlying phenomena, let us substitute a real 10 percent reduction in the cost of acquiring the regulated

company's plant and equipment items. That is, suppose that, at the beginning of 1979, some unspecified change in the cost of producing this plant and equipment occurs so that what had formerly cost $30 million now costs $27 million to purchase. Referring to Table 3, we would observe that the only changes in the income statement and the beginning and ending 1979 balance sheets would be elimination of references to "unamortized subsidy" and "subsidy amortization." The rate base would have shrunk by $3 million, assuming the regulatory authority is vigilant; the excess $3 million would have been returned to creditors and shareholders to dispose of however they chose; and the cost of service would have been shrunk accordingly. Similarly, at the end of 1979, $29.9 million of cash-flow would have been generated, $2.9 million in excess of the $27 million capital expenditure requirement at the beginning of 1980. Then Table 4 might simply be recaptioned to refer to the effect on rate base, income from sales, and cost of service in the event capital goods prices are reduced by 10 percent. Since the economics of a 10 percent capital subsidy are exactly the same as the economics of a 10 percent goods price reduction from the point of view of the private firm, the proper way to account for the latter is also the proper way to account for the former.

The mischief caused by accounting for a capital subsidy as "income" in the year received.

Note has been taken earlier of the self-fulfilling character of rate regulation. Because entry into regulated markets is restricted, and regulatory commissions prescribe accounting procedures on which they base maximum rates, the depreciation and other income accounting rules they prescribe produce the rates which, in the end, will validate the rules. If, in a particular year the rules produce too low revenues, market prices of regulated company shares will tend to fall,

destroying the relationship to book-value. Such an occurrence indicates the commitment to creditors and shareholders is being abrogated. Should revenue from sales fail to sufficiently cover out-of-pocket expenditures and contractual interest payments, to provide funds for dividends, and to finance the outlays for maintenance of plant and equipment, these consequences would follow: As analysts observe that the "interest coverage" provided by operating income has declined, they will downgrade the company's bond ratings. This will cause the company's borrowing rates to rise, and this will increase cost of service automatically as debt is refinanced or additional debt is incurred. If, as a result of inadequate cash flow from sales, dividend payouts are reduced, market prices of the company's shares would decline. Recognition of this possibility might exert pressure on regulated company managements to divert funds which would otherwise be used to maintain plant capacity to "dividend" payments. If this is done, the payments are, in fact, not distributions of current earnings but a "return of capital", either paid-in capital or reinvested prior year retained earnings. The consequence of this strategy is also to increase cost of service both because continuation in service of obsolete plant requires more down-time for repairs and repair expense or because the obsolete plant consumes more fuel.

Although regulatory commissions may respond with a time lag in making rules adjustments to cope with changing conditions, they are ineluctably driven to recognize real costs of producing a given quantity and quality of service. Lacking any taxing powers, they are unable to commandeer resources with which to produce utility services; they can only supervise rate setting and the quality of service to ensure customers each year cover cost of service. Of course, regulatory commissions may bring about a maldistribution of

cost of service over time by failure to respond to changed cost conditions with speed and accuracy. Thus, one further test of the rationality of the "normalization" rule is to examine what happens when a capital subsidy, or real reduction in the price of plant and equipment is arbitrarily accounted for by a regulatory commission as an increase, or source of, after-corporate-tax income of regulated company shareholders. This is popularly called "flow-through" accounting for a subsidy.

In terms of our illustrative example, Table 5 presents the 1979 "flow-through" outcome as it would appear in the financial statements of the regulated company. "Flowing-through" the $3 million capital subsidy permits a $5.56 million reduction in required 1979 revenues, as compared with the base case. This "amplification" of the $3 million flow-through to after-tax equity income results from the fact that a given amount of tax-exempt compensation is equivalent to a much larger pre-tax payment. In this case, "flowing-through" the $3 million capital subsidy to equity holders displaces $5.56 million in service charges customers would otherwise have to pay in order to yield the shareholders $3 million in after-corporate-tax income. Generally, the larger the tax rate applicable to market-derived income payments, the greater is the pre-tax income displaced by each tax-exempt dollar.5/ As compared with the 1979 results under proper accounting for the subsidy, or normalization, shown in

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5/ The reader should note that, for expositional simplicity, we have extended equality of tax and regulatory accounting to treatment of the subsidy, presumed to be in cash, as a tax-exempt income payment to shareholders. In fact, the tax accounting for a cash capital subsidy would be to exclude the subsidy from the depreciable basis of the property and this would increase the tax due as well as increase the required revenues.

Tables 3 and 4, 1979 rates are lowered by $4.94 million through this incorrect accounting for the capital subsidy. But, since "flow-through" procedures maintain the $465 million rate base, and hence the equivalent amount of private financing, as the balance sheets in Table 5 show, the lowered "flow-through" rates, which are permanently sustained so long as the subsidy remains in effect, merely borrow from the future. As may be seen in Table 4, in 1989 and every year thereafter, a proper accounting for the capital cost of service will yield a lower required revenue than "flow-through" procedures. In 1989, the properly measured cost of service is $268.76 million and declining while the "flow-through" cost of service is still $269.01 million, its permanent level.

"Flow-through" procedures never approach the cost of service reduction measured by the appropriate accounting for a capital subsidy because they, in effect, finance a larger first-year reduction in required revenues (and reductions for 9 more years, in our example) with the proceeds of additional borrowing and equity financing, for which rates of return will have to be paid. Since the rate base to finance this erroneous treatment of a capital subsidy is permanent, its recovery through depreciation and its interest and after-tax return to equity (plus income tax) will be permanently paid by the regulated utility's customers. There is no way to interpret cost of service rate regulation theory in a way which authorizes a regulatory authority to permanently impose a burden in excess of their real cost of service on future users of utility services in order to provide current users rates below their real cost of service.

This characteristic of "flow-through" accounting of a capital subsidy appears clearly when that procedure is applied to a real reduction in the price of plant and equipment items. Suppose again that on January 1, 1979, the $30

million vintage of equipment drops in price to $27 million. As we have noted before, this event should result in a $0.62 million reduction in the real cost of service, with the $3 million saving in equipment cost utilized to reduce the rate base. However, if a regulatory commission designates the $3 million saving in equipment cost an addition to "net income" attributable to shareholders' equity, while treating the $27 million of equipment purchased as if it cost $30 million, the current year cost of service could be reduced by $5.56 million; the $3 million saving is "flowed-through".6/ Thus, the rate base remains at $465 million, supported by that amount of debt and equity, rather than falling to $462 million, reducing the required amount of debt and equity. Clearly, to manipulate a lower current charge for service, $3 million of additional private funds are utilized in the regulated company, the unnecessary cost of which will ultimately have to be paid by utility customers.

Happily, this "flow-through" of savings in the cost of acquiring capital would never be tolerated by regulatory commissions: They would note that, for the same reason they did not "flow-through" to current cost of service the $30 million of equipment cost, nor the reduced $27 million cost (since neither expenditure was embodied fully in the service sold in the year of acquisition), it would be improper to consider the $3 million difference an addition to net income of the regulated company. Transactions involving the purchase of assets to be used for a period of years affect

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6/ Again, for simplicity, we assume that $30 million will be permitted as the tax basis for depreciation purposes. If only $27 million is paid, under the tax laws and all the normal rules of financial accounting, only $27 million of the taxpayer's (enterprise's) capital is recoverable through imputed depreciation allowances.

current year cost of service only to the extent the assets are used-up that year, as estimated by the depreciation imputation rule, and as the net investment of creditors and shareholders is changed by virtue of those transactions.

In view of the conclusion reached by this discussion of procedures for accounting for capital subsidies, the 17 years of controversy over the accounting treatment of the investment tax credit, the most general capital subsidy paid by the Federal government, is indeed perplexing. That there is any lingering question about the merits of "normalization" versus "flow-through" of the investment credit is probably attributable to the (originally) unconventional way in which the subsidy is conveyed. We now turn to the issues peculiar to the tax credit.

A capital subsidy paid as a credit against income tax.

To this point we have dealt with a 10 percent subsidy payable by the Commerce Department on the submission of evidence that a depreciable asset with an expected life of more than 7 years has been acquired for productive use. In the examples we have detailed above, the regulated company annually acquires $30 million of assets eligible for the subsidy, hence receives a cash payment on this account of $3 million so that the net cost to it is $27 million. Also, each year, the company pays income taxes, in amounts depending on the rate base and, consequently, on the amount of private equity invested, given the after-corporate-tax return required to maintain the value of the company's shares and the corporation income tax rate. The $27 million expenditure enters cost of service as depreciation allowances, returns to financiers of the (reduced) rate base and as taxes attributable to the equity share of those returns. The $3 million subsidized reduction in acquisition cost is reflected in reductions in each of these elements of cost of service.

Suppose that Congress, in order to reduce the volume of checks being written by the government decides to make capital subsidy payments in the following way: Companies qualifying for the subsidy will be permitted to simply subtract from the taxes otherwise payable by them the amount of the subsidy owed them; eligibility for the subsidy would still be documented by invoices, contracts and other evidences of purchase, as in the case of the subsidy payable by the Commerce Department. This mode of payment will save check-writing expense for the government; it will also save administrative expenses because the capital goods qualifying for the credit are already accounted for in the tax books-of-account reviewed by the IRS.

Under this mode of payment, i.e., as a credit against tax otherwise due, the illustrative regulated company, at the beginning of 1979 still has $30 million in additional cash and other current assets with which to purchase a replacement vintage of plant and equipment items. But now, when it buys the items, it will automatically reduce the cash requirement for paying taxes (included among the current liabilities in its end of 1979 balance sheet) by $3 million. Thus, the financial statements shown in Table 3 still correctly portray the results of its subsidized acquisition of plant: The $3 million of redundant cash would be used to reduce outstanding debt and equity to correspond with the $3 million reduction in rate base; the 1979 income statement would show exactly the same entries, including $23.61 million as provision for Federal income taxes, an amount that must be included in cost of service.

This latter figure, the $23.61 million provision for Federal income tax when $3 million less will actually be paid, is the source of continuing confusion as to the proper way to account for the capital subsidy. Many argue that the

$3 million is not "paid" and, hence ought not to be included in the 1979 cost of service, i.e., that the "reduction in tax" be "flowed-through" and accounted for as in Table 5. These persons regard the $3 million of investment credit not subtracted from the $23.61 million of 1979 tax expense and therefore included in cost of service as a "phantom tax" that inflates the cost of service and thereby enriches regulated company stockholders.

The confusion results from a common tendency of laymen to regard the clearance of payments through a single account as destroying the basic transactions which gave rise to the net payment. That is, while these same persons would agree that a Federal subsidy of $3 million paid in cash to a regulated company on the purchase of plant and equipment is perfectly consistent with a tax expense of $23.61 million that year; nonpayment of $3 million in tax liability in order to get the same subsidy as additional cash is inconsistent with the same tax expense of $23.61.

Since these persons are not persuaded of the analytical error they are committing by a demonstration that the dollar magnitudes resulting from a transaction in which $30 million of assets are purchased at a net private cost of $27 million are the same whether the subsidy is paid in cash, accompanied by a full payment of tax liability, or not paid in cash but cleared as a credit against tax liability, the following example may be helpful. Suppose that, included in the cost of goods sold for 1979, is $5 million of fuel purchased from company A and that included in the regulated company's 1979 sales is $1 million of services sold to A. Suppose further, that A and the regulated company have agreed that, in view of their reciprocal seller-customer relations, the regulated company will remit to A only the net amount owed it. The regulated company will therefore use its account payable to A

to clear amounts owed it by A. Thus, in the year in question, the $5 million of fuel purchases are recorded as an expense (debit) and as an equivalent account payable (credit); and the $1 million sales to A as gross income (credit) and an equivalent account receivable (debit). At the end of the year, the regulated company clears its account receivable from A of $1 million against the $5 million account payable, and closes its account payable by remitting a check for $4 million.7/ Clearly, the fact that the regulated company paid only $4 million in cash in settlement of the reciprocal obligations of it to A and from A to it does not mean that the $1 million in sales to A have been obliterated or that its cost of goods sold has been reduced from $5 million to $4 million, because this is the net cash remittance to the fuel supplier.

Similarly, when a capital subsidy, such as the investment credit, is cleared against the tax account of the regulated company, the clearing operation does not obliterate the tax liability generated by the company's operation, nor does it obscure the conveyance of a subsidy to the company in respect of its acquisition of property qualified for the subsidy. Thus, the accounting procedure that properly analyzes a cash subsidy for the acquisition of capital is also appropriate for a capital subsidy paid by permitting a credit

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7/ The accounting entries to reflect this clearing transaction are:

Debit: Accounts payable.....$1 million
Credit: Accounts receivable.....$1 million

Debit: Accounts receivable.....$4 million
Credit: Cash.....$4 million

Note that none of these entries affect entries for sales of $1 million to A or of cost of goods sold of $5 million (purchases of fuel from A).

against income tax. The "phantom tax" issue raised in connection with capital subsidies cleared through the tax system is a false issue: It arises from incomplete analysis of the transactions involved. Moreover, any careless consideration of "tax paid" net of subsidies, or other payments, cleared through the tax accounts of a given year as a measure of tax liability generated by a taxpayer's economic performance during a year will lead to a grossly misleading indication of the taxability of that taxpayer's income, or what is popularly called his "effective tax rate."8/

Differences between capital subsidies paid in cash and credits against income tax.

Although the accounting for capital subsidies, when paid, is independent of the form in which they are paid--whether as cash or as credits against income tax otherwise due--there are three notable differences between cash capital subsidies and the present investment credit. First, because capital subsidies cleared through tax accounts are regarded as "reductions in tax," the amount of the subsidy payable during a year is limited to the first $25,000 of tax liability plus (ultimately) 90 percent of the tax liability in excess of $25,000.9/ Although attachment of conditions

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8/ See U.S. Treasury Department, Effective Tax Rates Paid by Corporations, 1972, May, 1978.

9/ Prior to 1979, the annual limitation on the amount of investment credit that might be taken by a single taxpayer was the first $25,000 of tax liability that year plus 50 percent of the tax liability in excess of $25,000. In 1979, the annual maximum is the first $25,000 plus 60 percent of any additional tax liability, the percentage increasing by 10 points in 1980 and each succeeding year until it becomes 90 percent in 1982. Amounts of credit earned in any year but not taken by reason of this limitation may be carried back 3 years and forward 7.

to the granting of cash capital subsidies is not unusual, imposition of a requirement that the private investor have current tax liability is not a normal condition. The effect of this limitation on effective receipt of the capital subsidy is frequently a delay in its conveyance to the investor, and in some cases, partial denial of the subsidy.

The second difference between a normal cash subsidy for the purchase of qualified capital goods and the present investment credit is that the credit is payable in advance of the legal acquisition of the asset, under certain circumstances. If the asset in question takes more than two years to construct, then if the purchase contract calls for advance payments, popularly called "progress payments", then the investment credit may be taken as these payments are made.10/ This is a curious, and asymmetrical, intrusion of "cash accounting" procedures in a tax accounting system that, except for its general reliance on the occurrence of an exchange event to trigger "recognition" (measurement) of gross and net taxable income, applies accrual procedures.

The event that signifies entitlement to a purchase subsidy is the legal acquisition of the qualified property; the basis for the subsidy is the value of the property at the time acquisition occurs. If the terms are C.O.D., the exchange price covers all costs--including capital costs--incurred prior to the exchange; if the terms call for pre-delivery, "progress," payments, then part of the capital costs--interest on working capital--are assumed by the buyer; if the terms call for deferred payment, then two transactions are involved, an exchange of property, and a loan. In

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10/ Internal Revenue Code, section 46(d).

principle, the subsidizable basis of the property should be the same in all these cases, because the value of the property is the same when the property exchanges. If, in the progress payment case, an explicit imputation of the contribution by the purchaser to the value of the property in the form of interest on loans he has made were recognized, and that interest income attributed (and taxed) to him as lender, it would be clear that the "progress" payment should not trigger a "purchase" subsidy. The implicit amount of interest paid, like that paid to any creditor, would be incorporated in the selling price of the property, and that selling price, when paid on delivery, would constitute the basis for the purchase subsidy.

Under present tax law conventions, no interest is imputed with respect to progress payments; it neither appears in the taxable income of the implicit lender, nor is it accumulated as part of the cost of the property. It therefore follows that, when delivery has occurred and the property financed by progress payments has been placed in service, the amount of subsidy payable is less than it would be under a C.O.D. contract. But, this is as it should be, for part of the acquisition price has been paid with untaxed funds--the implicit interest on the advance of funds. To allow an acceleration of subsidy payments therefore provides an unwarranted enhancement of the subsidy that encourages this form of project financing.11/

11/To appreciate the illogic of allowing purchase subsidies when prepayments of the purchase price are made, consider whether purchase subsidies should be delayed as repayments of principal are made over the life of a deferred payment plan to finance the same purchase. This would clearly devalue the purchase subsidy. There is no reason to structure a purchase (or sale) subsidy in a manner to favor particular payment schedules.

As it happens, "progress" payments are common among regulated companies so that this unusual characteristic of the investment tax credit is particularly valuable to this sector of the economy. We shall not attempt to demonstrate here how this further reduces the cost of service for, to do so, we would have to introduce an additional set of accounts relating to "construction work in progress", an activity of regulated companies that is separate from its normal activities of producing and distributing services, which is of major concern here. Rather we will simply observe that, in terms of real resource costs, the $30 million expenditure for rate base assets we have been recording are already subsidized by some amount, the amount depending on the length of time the utility has taken to construct the $30 million unit it places in service each year.

The third difference between a cash capital subsidy and the investment tax credit derives from the tax treatment of the subsidy itself. Whereas a government grant (or other nonshareholder "contribution to capital") for the purpose of acquiring an asset is treated under the tax laws as not recoverable by the beneficiary of the grant, the subsidy conveyed as an investment tax credit is. That is, if the Commerce Department had paid $3 million toward the purchase of $30 million of equipment, the purchaser of the equipment would be treated under the tax laws, as under the normal rules of financial accounting followed in the balance sheet presentation above, as having only $27 million in private resources recoverable as depreciation.12/ However, when that same subsidy is conveyed as a credit against income tax, the investor is permitted to take tax depreciation deductions with respect to the $3 million of subsidy as well as the $27 million paid with his own (or borrowed) funds. Clearly, a 10 percent investment tax credit so structured is worth more, i.e., displaces more privately financed rate base, than a 10 percent cash subsidy.

12/Section 362(c).

Accounting for the "extra" subsidy inherent in the investment tax credit.13/

Just as it was convenient to develop rules for accounting for a subsidy by first examining it when paid in cash, so it will be illuminating to translate the additional subsidy element conveyed by tax depreciation of a capital subsidy into cash grant equivalents. To do this, we modify the original 10 percent subsidy paid by the Commerce Department in the following way: To enhance the capital subsidy while not initially paying the full amount, the Secretary of Commerce offers to add to the 10 percent subsidy, which is payable on submission of evidence that qualified property has been acquired, an additional subsidy in subsequent years, provided the purchaser retains and uses the property. Thus, the additional subsidy is formulated as an amount, payable at the end of each period of use, equal to the reduction in income tax payable had the government's grant been included in the investor's tax depreciation basis. The rationale for such a subsidy might be that the government believes that, first, by delaying the payment of the additional subsidy to the purchaser he will be disciplined into making fewer frivolous investments since he initially will have to pay the 90 percent unsubsidized portion of the asset's cost and wait for the remainder for the full life of the asset. Secondly, it might be thought that stringing out part of the subsidy

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13/ We do not here account for the enhancement of the investment credit resulting from its availability as "progress payments" are made. To do so would require complicating the presentation to separately account for the regulated company's construction activity. Since this is not related to current cost of service, it is better ignored in the exposition.

over the life of the investment will serve to induce the investor to squeeze out the full productivity of the asset. Gearing the amount of additional subsidy to the tax rate of the subsidized investor is questionable. There would appear to be no economic policy objective served by making the additional subsidy worth more to high-income investors. The basic 10 percent subsidy, of course, is equal-valued to all investors.

Under this revised formulation of the 10 percent capital subsidy, still assuming that tax depreciation imputation rules match those used by the regulatory authority, at the end of 1979, the first year of the subsidy program, the Commerce Department will pay an additional subsidy of $46,000 to the utility company. This is equal to 46 percent (the income tax rate) of $100,000, the annual depreciation of the subsidy ($3 million/30 years) for the 1979 vintage. At the end of 1980, both the 1979 and 1980 $3 million subsidies will qualify for an additional $46,000 payment from Commerce. Ultimately, after all 30 vintages have been brought within the scope of this modified subsidy, each year the regulated company will realize a cash subsidy of $4.38 million for each $30 million of plant and equipment it purchases: $3 million representing 10 percent of the purchase price of the qualified property, $1.38 million as supplementary subsidy for 30 vintages in use, at $46,000 per vintage. The annual subsidy per $30 million investment in qualified property is, therefore, effectively 14.6 percent ($4.38 million divided by $30 million).

Altogether, the revised "10 percent" cash subsidy will ultimately reduce the unsubsidized rate base of our regulated company from $465 million to $397.11 million, the remaining $67.89 million of capital having been furnished by the Federal government. Thus, the enhanced "10 percent" subsidy brings about the following cost of service:

Cost of goods sold	$165.00 million
Net depreciation	25.62
Interest paid	23.83
Income taxes	20.30
After-corporate-tax return to equity	23.83
Total cost of service	$258.58 million

By reducing the capital cost elements by 14.6 percent, the "10 percent" subsidy supplemented by future subsidies equal to the value of private tax depreciation of the initial subsidy succeeds in reducing total cost of service by 5.8 percent.

The present investment tax credit possesses exactly the characteristics just described for an enhanced "10 percent" capital subsidy. It therefore follows that the proper procedure for accounting for the investment credit is that also just described: While the tax expense entering cost of service is $20.30 million each year after full adjustment to the enhanced subsidy, a total capital subsidy of $4.38 million is cleared against this accrued liability, resulting in a payment of $15.92 million in cash to the Treasury and leaving $4.38 million as an addition to "unamortized subsidy" which will exactly offset the amortization of the balance in that account and sustain a net rate base of $397.11 million financed by $238.27 million of bonds and $158.84 million of equity.

III. Accounting for a subsidy for the financing of capital.

Subsidies to private capital formation may either be in the form of grants, or the investment tax credit, discussed

above, or in the form of financing. In the case of grants, the government assumes some part of the cost of acquiring the eligible property, thereby relieving the customers who purchase the product of this capital of a part of the costs of replacing the capital as well as the return thereon (and the income tax attributable to that income). In the case of financing subsidies, loans to displace private financing are either made directly by the government, or the terms of private loans are subsidized, i.e., by government guarantees to lenders which reduce loan rates of interest, or by governmental assumption of all or part of the interest payments to lenders. Thus, in the case of subsidies pertaining to the financing of private capital, customers are relieved only of the subsidized capital return costs; they must still pay prices which will permit recovery of the capital used-up in production.

Normally, the accounting for interest subsidies raises no issues. However, the formulation of Federal financing subsidies commonly described as "tax deferral" contains elements that confuse analysts and laymen alike, making the accounting for these subsidies a continuing source of controversy, again centered on debate over the merits of "normalization" or "flow-through". To clarify analysis of a proper accounting for such subsidies, we shall again first specify the present "tax deferral" subsidy as a program administered by the Commerce Department to derive from its structure and functions a set of accounting procedures capable of measuring the impact of the subsidies. These will again be found transferable exactly to an accounting for the same subsidies cleared through the tax system. And once more, these procedures will be found to be those called "normalization."

A "zero interest" Federal loan for financing the purchase of qualified property.

Suppose that, beginning on January 1, 1979, Congress authorizes the Secretary of Commerce to make loans, at zero rates of interest, to any purchasers of depreciable property in order to assist them with the financing of this form of capital formation. The Secretary, after seeking a formula which would be easy to administer, avoid 100 percent financing, and could be flexibly adapted to the varying life characteristics of depreciable property, devises this formulation: At the end of each year after the purchase of depreciable property, the Commerce Department will lend a sum to the owner, at zero interest, equal to the product of his tax rate times the difference between a proclaimed depreciation imputation schedule for that property and one which describes the real economic decay of that property. The proclaimed schedule will simply be that produced by the sum-of-years' digits formula computed for a life equal to 80 percent of the real life. The "real" life and depreciation imputation schedule will be that used for financial reporting.

This is an extremely clever formulation of the terms of a loan to achieve the objectives of Congress in authorizing the program to encourage private capital formation:

1. The timing of loans and their repayment are automatically determined. Since the total basis of the asset to be recovered under either the proclaimed schedule or the real underlying schedule is the same, loans automatically will be extended in the early years of the ownership of the property, repaid in the later years.

2. The amount of the loans will be greater the more durable the asset, i.e., the longer lived and/or decelerated the pattern of real underlying depreciation. This is desirable because the private financing needed to "carry" assets is roughly correlated with durability.14/

On the other hand, because the amount of the financing subsidy thus provided is directly proportional to the investor's tax rate, the program formula lends more to high income investors than others. Again, this seems to serve no useful economic policy objectives.

Accounting for the specified "zero interest" loan subsidy.

In tracing out the effects of this Federal lending program, it is helpful to ignore any subsidies for purchasing the assets. Considering only the loan, since the regulated company's 1979 investment qualifies for the zero interest, or interest-free, Federal lending program, we may easily determine the schedule of such loans and repayments this vintage of investment will generate. This is shown in Table 6. The proclaimed schedule of "depreciation" amounts in this case

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14/ In the limit of non-durability, an asset which is used-up and requires replacement each year will require a cost of service charge for depreciation equal to replacement cost and no private financing of its acquisition is required; the beginning balance sheet will show $X for such an asset, the ending balance sheet zero, with cash and other current assets increased by $X, available for purchasing a replacement. Virtually no capital is required to carry such an asset. At the opposite extreme, an infinitely durable asset costing X will require permanent financing of X.

will distribute the $30 million cost of the qualified property over 24 years (80 percent of 30) by the sum-of-years' digits formula. Thus, in the first year, the proclaimed schedular amount for the regulated company is $2.4 million. Since its norm for depreciation that year is $1 million, it can borrow from the Commerce Department $644,000 at the end of 1979 ($2.4 million, less $1 million, times the 46 percent tax rate equal $644,000). At the end of 1980, the 1979 vintage will qualify the regulated company for an additional $598,000 of interest-free borrowing, and so on, through 1992 for, in 1993, the proclaimed schedular amount is equal to the depreciation norm of $1 million. Through 1992, $4.8 million of interest-free borrowings will have been generated by the 1979 vintage. Then, beginning in 1994, under this lending program, repayments begin so that, when the 1979 vintage is retired at the end of 2008, all $4.8 million of outstanding loans generated by the 1979 vintage will have been repaid.

However, at the beginning of 1980, the regulated company will acquire another $30 million of qualified property, and this, too, will generate qualification for interest-free loans. Indeed, at the end of 1980, the $598,000 of loan eligibility of the 1979 vintage just noted will be added to by the $644,000 first-year contribution of the 1980 vintage, providing a total of $1.242 million in new interest-free loans.

Continuing with the assumption of no growth or inflation, Table 7 arrays the annual results of this lending program over the next 30 years. In columns (2) and (3) are shown the annual loan proceeds to which qualified property in service entitles the regulated company. For 1979, the $644,000 generated by that vintage is shown in column (2), as is the combined $1.242 million the 1979 and 1980 vintages

generated at the end of 1980. Returning our attention to the end of 1979, it is obvious that the $644,000 of interest-free loans may be used to eliminate that amount of private financing of the $465 million of rate base; thus, at the beginning of 1980, $644,000 of debt and equity has been retired, leaving only $464.356 million of private financing for the $465 million of rate base. Then the additional loan eligibility of $1.242 million generated during 1980 enables the retirement of that additional amount of private financing so that, at the beginning of 1981, private debt and equity to support the $465 million rate base has been reduced to $463.114 million.

Until 1992, the addition of each vintage of assets increases the regulated company's loan eligibility each year by an amount greater than the preceding year. The reason why increases in the annual increment to loan eligibility peaks in 1992 is that, after that year, as we saw in Table 6, loans with respect to the 1979 vintage have to be repaid. Thus, in 1993, the combined increment to loan eligibility provided that year by the 1993 vintage and others is offset in part by repayment of $46,000 with respect to the 1979 vintage assets. Beginning in 1994, the annual increment to loan eligibility declines, reaching zero in 2008, after all vintages in use have become eligible for interest-free loans to the regulated company.

By the beginning of 2008, outstanding interest-free loans to the regulated company have increased to $94.3 million, a total which will remain constant so long as the regulated company maintains its stock of subsidy-financed plant and equipment (rate base). Should it fail to spend $30 million some year, it will have to reduce its interest-free loans outstanding, pay-off $644,000 that year, the amount of expiring loans with respect to all its vintages not offset by

"new" lending for the vintage not acquired. But, since we have no reason to suppose that the regulated company will not continue to maintain its rate base, the $94.3 million of interest-free loans will be sustained by the equivalent of "rolling-over" outstanding private bonds: Loan repayments will be covered by new borrowing.

The ultimate effect of the Commerce Department lending program has been to reduce the unsubsidized financing of $465 million required to sustain a $465 million rate base to only $370.7 million, with consequent reductions in the cost of service. The effects on cost of service resulting from the subsidized financing program are tabulated in columns (5)-(9) of Table 7. Since the subsidy does not reduce the private cost of purchasing plant and equipment, the $30 million annual depreciation cost of service remains unaffected. However, the interest paid, income tax, and after-corporate-tax return to equity steadily declines as Federal interest-free financing grows. Ultimately, since the private financing required is reduced by 20.3 percent, the portions of cost of service relating to returns to private capital similarly decline, and this brings about a 5.9 percent reduction in total cost of service, from $274.57 million to $258.43 million.

Clearing the interest-free loan program through the income tax.

The lending program just described required the Commerce Department to write checks in exchange for private firms' notes agreeing to the terms of the loan, including repayments. Once again, the necessity for writing checks to implement the financing subsidy program can be avoided by clearing the government lending through the income tax accounts of investors. Indeed, this has been done. In 1954,

all taxpayers were allowed to use formulas for determining annual depreciation allowances that include the sum-of-years' digits method and others consistent with it, whether or not this matched the real depreciation pattern of assets. Beginning in 1971, taxpayers have been allowed to use 80 percent of the guideline life for such assets published by the Treasury Department, regardless of the economic lives of their assets. In certain other cases, Congress has explicitly introduced 5-year write-offs and immediate expensing privileges that are the functional equivalents of interest-free lending programs described above.

It will be recalled that the magnitude of the interest-free loans is dependent on the difference between the "proclaimed" schedule of depreciation allowances and that which would be used for actual income measurement. This characteristic of the lending program raises certain issues concerning the "norm" of depreciation imputation that should be used for "actual" income measurement, a matter to which we will turn below. However, in the regulated company case, as has been noted above, the depreciation imputation norm is specified and validated by regulatory commission rate making rules.

Thus, to the extent that <u>taxable</u> income of utilities is measured with the use of depreciation imputation rules that depart from those used by regulatory commissions, the Federal government is implementing an interest-free lending program of the type just described. Prior to the modifications of the tax laws beginning in 1954, there was reasonably close correspondence between the regulatory and tax rules governing depreciation imputation. In regulated industries, therefore, the post-1954 deviations of tax rules for income measurement from regulatory norms marked the introduction of a subsidy program that may only be correctly accounted for as a source of interest-free loans.

We may translate the discussion above of an accounting for the effect of interest free Federal financing into the terminology of regulatory accounting for tax expense as follows: Attendant on investment in depreciable assets is the need to measure pre-tax income flowing from their use, after making allowance for the ultimate worthlessness of those assets due to wear-and-tear and to obsolescence. Whatever formula is used for imputing the occurrence of this decline in value over the life of the assets in order to measure taxable income, the same total imputation will be made for regulatory purposes. If the tax rules result in larger depreciation imputations early in the lives of assets than is imputed under regulatory rules, then tax depreciation imputations for the same assets will be smaller later in the assets' lives. In effect, the entries in Table 6 measure the time-displacement of tax payments--"tax deferral"--not a "forgiveness" of tax. Since income tax is a statutory percentage of income, and income is a function of the privately financed capital used to produce service by the regulated company, then if, and only if, the regulatory commission computes tax expense--an element of cost of service--by using its own depreciation imputation rules will it measure and fairly distribute the cost of capital services over time. "Tax deferral" represents interest-free borrowing, the benefits of which will be distributable to customers as the loans, generally called "deferred taxes", displace private financing.

This accounting procedure is called "normalization" of the difference between income tax liability, the current year tax expense, using the company's depreciation imputation rules (the regulatory commission's rules in the case of a regulated company) and that using the tax depreciation imputation rules. The tax liability computed using the regulated company's own rules, since it is purely a function

of the tax rate applied to an income measure based on the value of assets employed, and which are privately financed, is the correct measure of income tax expense for the period; the difference, "deferred taxes" is a source of financial funds available (and used) to displace private financing.

The financial statements for 1979 that reflect this procedure are shown in Table 8. The only difference between these statements and those of the base case for the same year (Table 1) is the $0.64 million ($644,000, rounded) of deferred tax: In the income statement reflecting the first-year lending program, tax expense of $23.77 million is presented in two parts, the net $23.13 million payable after netting the $0.64 million of interest free loan plus the loan proceeds for the year itself, labelled "deferred tax"; in the end of 1979 balance sheet, deferred tax appears on the liability side, offset on the asset side by an equivalent $0.64 million of cash and other current assets. This raises total assets and liabilities to $565.64 million at the end of 1979. When the $0.64 million is used to reduce debt and equity, at the beginning of 1980, the asset and liability totals will revert to $565 million. This process of displacing private financing of the rate base, shown in Table 7 to reflect the accumulation of interest-free loans, can occur, of course, only if the regulatory commission properly regards the total tax expense, computed on the basis of its own depreciation imputation rules and also shown in Table 7, as a cost of service. Assuming prompt regulatory response, this normalization procedure to account for the effects of an interest-free lending program charges each year's customers their true (private) cost of service, as this has been reduced by the volume of interest-free lending by Federal taxpayers.

Mischief caused by regarding the proceeds of interest-free loans as additions to equity "income" for the year.

The fundamental accuracy with which "normalization" of subsidies cleared through the tax system accounts for the underlying phenomena can be demonstrated again by considering the outcome of "flow-through" procedures applied to proceeds of interest-free loans cleared through income tax accounts. In Table 7, column (2) arrays the annual amount of interest-free loans, or "deferred taxes", generated by the volume of subsidy-qualified property then in service. If these loan proceeds, payable to the regulated company in exchange for notes labelled "deferred taxes", are simply regarded as "reductions in tax" for the years in question, then they make possible a reduction in required revenues that is a multiple of the deferred taxes. As noted in connection with "flow-through" of the investment credit, since these payments are tax-exempt, at a tax rate of 46 percent each dollar of loan proceeds can displace $1.851 of pre-tax--customer-paid--income from sales. For example, in 1980, as shown in column (2) of Table 7, the 1979 and 1980 vintages generate $1.242 million of interest-free loan proceeds that year. This makes possible a reduction in required revenues of $2.3 million ($1.242 times $1.851) as compared with the base case level of $274.57 million, or a required 1980 revenue of $272.27 million. If that is the 1980 revenue, after deducting $165 million (cost of goods sold), $27.9 million (interest paid), and a tax depreciation deduction of $32.7 million (28 vintages @ $1 million each plus $2.3 million for the 1979 vintage and $2.4 million for the 1980 vintage), taxable income is $46.67 million, and the tax liability payable is $21.47 million. This amount is treated as tax expense for the year, "deferred tax" not being recorded; the interest-free loan is therefore not accounted for by the regulatory authority. The required 1980 revenue of $272.27 is decomposed in that year's income statement as follows:

Cost of goods sold....	$165.00	million
Depreciation.....	30.00	
Interest paid.....	27.90	
Federal income tax paid.....	21.47	
Net return to equity..	27.90	
Total.....	$272.27	million

Table 9 shows this annual required revenue from sales, along with those for 1979 and other years through 2009, under a regulatory procedure which "flows-through" to net income of equity the proceeds of interest-free loans made available for depreciable assets acquired after January 1, 1979. To compare this result with a proper accounting of the effects of interest free loans, the required revenues from sales under "normalization" accounting for each year, transcribed from Table 7, are also shown. Under the "flow-through" procedure costs of service assessed steadily drop until 1992, and after 1993 steadily rise. This pattern mirrors the pattern of interest-free loans generated, shown in column (2) of Table 7. Thus, by 2008, when no additional interest-free loans are generated to clear through the tax accounts, the "flow-through" required revenue from sales that year has returned to the base case level, where it will remain so long as there is no change in the rate base.

Given the nature of the underlying phenomena, a shifting in time of tax liabilities, and hence the generation of interest-free loans, the "flow-through" pattern is indeed curious: until 1992, "flow-through" procedures afford customers lower rates than if the loan proceeds were properly accounted for as interest-free loans; thereafter, they are assessed higher charges, and by 2008, they are paying rates as if the Federal loan program had never existed or continued

in effect! Any technique for accounting for the effects of tax deferral which produces such results must be defective: so long as tax deferral is in effect, and the calculations here assume the subsidy program is permanent, it should be reflected in lower costs of service. Though the conditions in 2009 include the interest-free loan program while the base case does not, revenues required in the two instances are the same. If this is the result of "flow-through" accounting for the loan program, it must be an improper regulatory accounting technique.

The inherent error of "flow-through" techniques is their failure to account for the cumulative effect (a growing stock) of interest-free loans provided by artificially accelerated tax depreciation imputation methods. It therefore misallocates the proceeds of interest-free loans to current year consumers as a cost of service reduction; this deprives future years' consumers of the benefit of interest-free financing of plant and equipment. As noted in the previous section dealing with the accounting for a capital purchase subsidy, forcing future generations to pay the price of unnecessary private financing of rate base is a policy inconsistent with the objective of cost of service rate regulation. Under that regulatory procedure, each year's customers ought to pay the cost of <u>their</u> service; they should neither be forced to bear a burden to benefit future generations of customers, nor be given price breaks that will be a burden to other generations.

Moreover, in the (improbable) event that replacement does not continue so that loans will have to be repaid, the generation of customers in that year will experience an increase in cost of service. For example, if in 2009 the $30 million is not spent on replacement, $644,000 of the deferred tax will have to be repaid. But, in order to "repay" this,

income from sales will have to be increased by $1.193 million above the base case, which has no subsidy! Had the subsidy been accounted for properly in the first instance, the increase in tax payable due to a net repayment of deferred taxes would not have been accounted for later as an increase in cost of service. Rather the $644,000 would be correctly accounted for as a reduction in deferred taxes, a repayment of outstanding loans, and this would not require an increase in current cost of service.

The combined effect of the two tax subsidies.

The previous section showed how the investment tax credit, if properly accounted for in the cost of service, would ultimately reduce the rate base of $465 million required, absent a subsidy, to $397.11 million requiring private financing. In this section we have shown how a properly accounted for interest-free lending program financed through the income tax accounts would reduce the required private financing of rate base assets by 20.3 percent. Table 10 summarizes the combined effect of these two subsidies on the cost of service, when the assumed static stock of assets required to produce the established level and quality of service have all come under the cover of the subsidies.

As noted, the investment credit, by providing complete Federal financing and replacement of 14.6 percent of the $465 million worth of plant and equipment, reduces the financing requirement to $397.11 million. Then, the interest-free loan program provides $80.53 million of financing, leaving only $316.58 million to be financed with long-term debt and shareholder equity. The net effect of these two subsidies is, then, a reduction in all the capital cost elements: the net depreciation charge is reduced by the investment tax credit, and the interest, income tax and return to equity are reduced

by both the investment credit and the loan program. Altogether, the capital cost elements have been reduced by 30.6 percent, from $109.57 to $76.06 million, and this translates into a total reduction in cost of service of 12.2 percent, from $274.57 to $241.06 million. Depending on the responsiveness of service demand to this reduction in cost of service, expansion of service capacity, and hence plant, will ensue.

It is worth noting in conclusion that the indicated reduction in tax liability shown in Table 10 does not imply some net reduction in Treasury revenues. We are here examining only the outcome of Federal subsidies for a unit of capital employed by a regulated company to provide utility services. The reduction in income tax revenues generated by these subsidies to private capital formation, which are translated into reductions in prices paid by customers, are regenerated when the purchasing power released in lowered prices is spent for other goods and services. Whether these tax subsidies to private capital formation result in net changes in Treasury revenue flows depends largely on whether the response to the subsidy programs in the aggregate stimulates a net change in the tax base, i.e., GNP originating in the private sector. This is an empirical question for which there is as yet no definitive answer.

IV. Consistency of Tax Subsidy Normalization Rules with Dynamic Change

Relaxing the no-growth assumption: the investment tax credit

The foregoing accounting of the way in which subsidies to private capital operate to reduce the private cost of, charges for, service in the context of fair rate of return

utility regulation was intentionally presented with the aid of a model of a regulated company in "stationary equilibrium." Assuming the regulated company merely operates a fixed stock of plant and equipment items incorporating an unchanging state of technology and using labor and materials with similarly unchanging costs makes it possible to clearly trace out the effects of a subsidy. The accounting of these effects, however, is not dependent on the model's assumptions.

For example, suppose that, as a result of the subsidy-induced decline in service charges, or for any other reason, the amount of service demanded in the regulated company's market increases. Then, in addition to the $30 million annual investment in plant, some additional investment will be made to expand capacity. Suppose that a one percent increase in capacity is called for in 1979, and approved by the regulatory commission. If the book-value of the existing plant is $465 million, a one percent expansion would require an additional expenditure of $4.65 million, if the entire expansion is made at the beginning of 1979. Absent a purchase subsidy, $4.65 million of additional financing, $2.79 million of new issues of bonds, $1.86 million of stock (or retention of that amount from 1978 after-corporate-tax income of the company), would be required. In 1979, this addition would add $0.155 million of depreciation to cost of service, $0.279 million for interest, a like amount for return to equity, and $0.238 million to income tax expense.

If, in 1979, a 10 percent investment credit is introduced, the combined purchase of $34.65 million that year would generate a subsidy of $3.465 million (plus $1.594 million later). Then, just as we saw above, the subsidy would ultimately decrease capital costs of service of both the initial rate base and the 1979 increment by the relative

size of the subsidy, 14.6 percent in the case of the present investment credit. Moreover, the availability of $3.465 million in cash due to the subsidy means that only $1.185 million of new financing will be required at the beginning of 1979 to finance the additional $4.65 million acquisition.

Thus, introducing growth changes nothing in the accounting for the investment subsidy. However, it is worth noting that because the dollar magnitude of the investment subsidy each year is determined by the sum of "replacement" plus "new investment", the net new financing required for the addition to capacity (rate base) is greatly reduced; the redundant private financing with respect to "replacement" rate base is available to help finance the increment to rate base. In inflationary times, when mere "replacement" prices rise, the additional current dollar investment called for which would also have to be financed with additions to debt and equity, equally benefits from the subsidy as if it represented real growth. Thus it can be seen that in any period in which regulated companies are both growing in a real sense and plant and equipment costs are inflating, the existence of a subsidy program greatly reduces the search for additional private financing. This is probably why regulated company managements have come to regard the investment credit as essential "means" of financing their annual outlays for plant and equipment. Again, the use of cash or other accounts through which to clear a multitude of transactions may cause careless observers to accept this fallacious interpretation of the function of a capital subsidy.

Deferred taxes

In a similar fashion, interest-free loans generated by additions to capacity provide the same pattern of future reductions in cost of service associated with additions as

was observed above in connection with the gradual qualification of all the vintages of plant for deferred taxes. Continued growth, or inflation, by generating larger combined loan eligibility for each vintage of "replacement" and the "new" investment, provides a larger fraction of each year's new financing requirements and again creates the illusion that the current year's subsidy is mainly an expansion financing device. Of course, in terms of the underlying economics of the transactions, while the aggregate displacement of private financing of the rate base may be large relative to any current year's purchases of plant and equipment, the distinction between the two elements of the displacement--that pertaining to additional loans for which previously acquired property become eligible and the other pertaining to the first-year eligiblity of the increment--should not be obscured simply because both elements are cleared through the current year's tax account.

It is worth noting in passing that, if the rate of growth of annual outlays for rate base assets rises at a high enough rate, the point at which annual required revenues determined by "flow-through" of interest-free loan proceeds exceeds the revenue required under a proper accounting of these loans is delayed, as compared with the no growth case we have examined in detail above. So long as growth and/or inflation cause the rate base to increase, the cumulation of deferred taxes also increases. Thus as compared with the U-shaped cost of service decline from 1979 to 1992 and rise from 1993 to 2008 shown in column (2) of Table 9, which may be regarded as a cost per unit of output because it is assumed capacity remains constant, had annual outlays grown at some constant rate, the cost curve would have been stretched over time, the minimum cost of service would have occurred after 1992, and so long as the annual rate of growth had persisted, the annual cost per unit of service would

never quite return to the unsubsidized level. However, even under these circumstances, the cost of service established under "flow-through" accounting procedures would never reach the levels of correct cost of service calculation. If properly accounted for, the continued increase in interest-free financing of the growing rate base would bring about steadily declining costs of service.

In sum, the appropriate accounting for subsidies cleared through tax accounts in no-growth situations is also appropriate for a growth situation. In either case the technique called "normalization" distributes the benefit of the subsidies to customers over time in accordance with the terms of the subsidies: the investment credit as an initial reduction in the acquisition cost of the qualified property, plus subsequent supplements earned as the asset is held in use; the interest-free loan program, with the proceeds in the form of deferred taxes determined by the loan and repayment schedule implied by the divergence between tax and regulatory rules for imputing the occurrence of depreciation, as a displacement of private financing.

Effects of unforeseen changes.

Suppose that an investment error has been made: The "wrong" facilities were acquired at the "wrong" time. That is, facilities were built to embody a technology that later proves to be inefficient, or the plant is located on a site that later appears to have been badly selected, or anticipated demand for utility services has failed to materialize. These investments that subsequent events prove to have been made in error are incorporated in the rate base. Under the logic of fair rate of return regulation, since the regulatory commission has tacitly approved inclusion of the "excess" investment in the rate base, the costs of these "mistakes"

are distributed to customers over time in the form of charges for depreciation, rate of return, and income taxes.15/

The accounting for subsidies cleared through the tax system is, of course, not affected by this; the subsidies generated by the mistaken investment should be distributed in the same way as the mistaken costs themselves. It is also probably the case that, if there are subsidies which have the effect of reducing private costs of acquiring and using capital, more "mistakes" will be made pari passu with the increase in investment that may be induced by the lower cost of service made possible by the subsidies. However, given a quality of regulatory vigilance over the investment planning of regulated companies, there is no reason to suspect they will relax their vigilance because subsidies are available. The relative cost of "mistakes" is not altered by the subsidies, which apply equally to "good" and "bad" decisions.

V. Extension of the regulated company analysis to unregulated companies.

The phenomena associated with the provision of subsidiees for the acquisition, or financing, of private capital are the same in both the regulated and unregulated sectors. It therefore follows that the proper accounting of tax subsidies described above for regulated companies applies equally to unregulated companies. In the unregulated sector,

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15/ Footnote 1 indicated that surveillance over the quality of regulated company decision making is one of the responsibilities of regulation. In unregulated markets, commission of investment errors results in losses to equity owners. As a consequence, rates of return to equity in the unregulated sector tend to be higher than rates of return in the regulated sector.

however, the economic import of the company's own accounting system is much less. Because entry into markets in the unregulated sector is more or less free, and because there is also inter-product competition in the unregulated sector, selling prices, and hence revenue from sales, does not annually track changes in cost of goods sold and the several elements of capital cost as these are recorded in the financial records. "Required revenues" to cover all costs, including a "fair rate of return", cannot simply be obtained in unregulated markets by the mere posting of such prices.

In the regulated case described above, capital cost changes were "rolled-in" over 30 years, the average life of the plant. This is one example of average cost pricing: The annual charge for depreciation, interest, and return to equity is derived from the costs of the 30 prior years. Thus, when a subsidy, or any other cause for a reduction in private cost of acquiring capital, reduced the purchase price of capital by 10 percent, 30 years had to elapse before the full change in cost, the lower marginal cost, was finally realized by customers. And with perfect cost of service regulation over this period, the regulated company's book-value of rate base was kept equilibrated to the market value of the company's bonds and shares.

In the unregulated company case, however, where market prices are freer to vary as cost conditions change, revenues more quickly adjust to cost changes. For example, after a 10 percent capital purchase subsidy has been introduced, in an industry which replaces its capital in, say, 15 years, it will not take 15 years for the effect of the subsidy to work its way through to prices and revenue. New firms, for example, or divisions of firms in other industries, that equip themselves after the introduction of the subsidy will be able to install a plant at 90 percent of the cost of

plants built before the subsidy. These firms will be able to price their output lower to capture larger shares of the market, and this will force older firms to more rapidly adjust prices downward to reflect the lower costs or be forced out of business. For an unregulated company, therefore, the historic book-value of assets acquired before the subsidy, and the corresponding book-value of equity, may be overstated as compared with the valuation placed on these assets in the market, after a subsidy has been introduced. For example, if market prices of products adjusted instantaneously to the change in marginal capital costs, then the earnings of pre-subsidy assets, and the corresponding equity, would immediately shrink. These lower "earnings per share" of "old" firms would cause market prices of these shares to decline, which is to say the market value of pre-subsidy assets carried in balance sheets would be lower than book-value.

In the unregulated sector, then, the response to a capital subsidy is much more rapid than in the regulated sector. A 10 percent purchase subsidy will more quickly lead to a higher rate of investment to expand capacity. Of course, after adjustment to the reduction in capital costs has been made, the only effect of the subsidy will be to sustain the higher replacement investment required to sustain the larger capital stock it has induced.

Deferred taxes in the unregulated sector.

The foregoing remarks on the looser ties between book-value and market value of unregulated company assets and equity than is found in the regulated sector apply also to the substantive content of unregulated companies' imputations of depreciation for financial reporting purposes. For an unregulated company, its depreciation imputation rules do not

determine a "cost of service (production)" element it can "claim" in prices it charges. Rather, it is an accounting convention employed to derive a financial measure of pre-tax income, and to correspondingly revalue depreciable assets in its balance sheet. If the company's depreciation imputation rule produces too low an annual depreciation "expense", as compared with real depreciation, this simply means that pre-tax income for the period is overstated, and "net income" (after-tax) likewise. But, since dividend payouts need not correspond to this measure of book-income, there is no financial or other penalty to overstatement of book-income. On the other hand, if the depreciation imputation rule used by an unregulated company aims to rapidly write-off assets, regardless of the real rate of depreciation, its book-pre-tax income will be understated, and its "net income" correspondingly. Again there is no penalty for not measuring income in a manner such that the amount so measured could actually be paid out and permit the company to carry on its operations, as in the regulated company case.

Of course, "quality" of reported earnings is an important dimension of a company's performance that is carefully assessed by investment analysts. Shares of companies that employ depreciation imputation methods calculated to overstate "net income" will naturally sell for prices that are smaller "multiples" of reported earnings per share in recognition of this source of "low quality" earnings; companies that use more accelerated depreciation imputation methods will sell for a higher multiple, all other things being equal. Since too slow a method of imputing depreciation also results in a higher book-value of depreciable assets, book-value per share of companies employing such depreciation methods will tend to exceed market value on this account, as

well. Conversely, the consistent use of too rapid depreciation imputation rules for financial reporting will be associated with a market value in excess of book-value.16/

Since the depreciation imputation method employed by an unregulated company has no normative value, the divergence between it and tax depreciation imputation methods also has no normative implications. However, the logic of accounting in the unregulated company case nevertheless requires recognition of "deferred taxes" for, whether the book imputation really measures depreciation, timing differences between it and tax depreciation must be accounted for if only to provide a record of the degree to which assets employed in the business have less "tax basis" to be recovered than the assets' reported book-value and, therefore, how much extra income tax liability might be owed in the event assets are not replaced. Thus in the case of unregulated companies, due to the uncertain content of the company's reported (book) depreciation, reported accrual of "deferred taxes" during a year is not normally a satisfactory measure of interest-free loans extended.

To obtain a measure of interest-free loans extended to unregulated companies requires that an independent, reliable measure of depreciation for the year be computed and this be compared to the tax depreciation imputation allowed for the same year. The corrected figure, less the tax depreciation amount, times the corporate tax rate yields the measure of interest-free loans qualified for during the year, the proper

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16/ Cf., Solomon, Ezra, "Alternative Rate of Return Concepts and Their Implications for Utility Regulation," Bell Journal of Economics and Management Science, Vol. 1, No. 1, (Spring, 1970), pp. 65-81.

"deferred tax amount" to add to the net income tax payment to derive tax expense for the year. As has been noted elsewhere, the "effective tax rate" of an unregulated company is then a ratio, the numerator of which includes the corrected deferred tax plus net tax paid (gross of credits) and the denominator of which is the pre-tax income corresponding to the corrected book depreciation.17/

17/ Fiekowsky, S., "Pitfalls in the Computation of "Effective Tax Rates" Paid by Corporations," OTA Paper No. 23, U.S. Treasury Department, 1977. This paper briefly catalogues the numerous payments that are cleared through current year tax accounts and which, therefore, make "taxes paid" during a year a poor measure of tax liability generated by a corporation's operations that year.

Table 1
Base Case Financial Statements

Income Statement
for year, 1979
(millions)

Income from sales		$274.57
less: Cost of goods sold		165.0
equals: Operating income		$109.57
less: Depreciation	$30.00	
Interest paid	27.90	57.90
equals: Pre-tax income		$ 51.67
less: Provision for Federal income tax @46 percent		23.77
equals: After-tax ("net") corporate income		$ 27.90
less: Distribution to stockholders		27.90
equals: Addition to retained earnings		0.00

Balance Sheets
1979
(millions)

Assets	Beginning	End	Liabilities	Beginning	End
Cash and other current assets	$100	$130	Accounts payable (including taxes)	$100	$100
Plant and equipment original cost	$900	$900	Long-term debt	279	279
less: accrued depreciation	435 $465	465 $435	Net worth: Capital stock	186	186
Total assets	$565	$565	Total liabilities	$565	$565

Table 2

Illustrating Maintenance of A Constant Capital Stock, When The Regulatory Depreciation Imputation Rule is Straight-Line

Year asset vintage was acquired (Jan. 1)	Assets in use, at beginning of 1979: Original cost	Accumulated depreciation	Net book-value	Assets in use, at beginning of 1980: Original cost	Accumulated depreciation	Net book value
1950	$ 30	$ 29	$ 1	-	-	-
1951	30	28	2	$ 30	$ 29	$ 1
1952	30	27	3	30	28	2
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
1959	30	20	10	30	21	9
1960	30	19	11	30	20	10
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
1978	30	1	29	30	2	28
1979	30	0	30	30	1	29
1980	-	-	-	30	0	30
Total	$900	$435	$465	$900	$435	$465

Office of the Secretary of the Treasury
Office of Tax Analysis

February 27, 1979

Table 3
Financial Statements, With 10 Percent Capital Subsidy

Income Statement
for year, 1979
(millions)

Income from sales		$273.95
less: Cost of goods sold		165.00
equals: Operating income		$108.95
less: Depreciation	$30	
Subsidy amortization	(0.1)	
Interest paid	27.72	57.62
Pre-tax corporate income		$51.33
less: Provision for Federal income tax		23.61
equals: after-tax ("net") corporate income		$27.72
less: Distributions to stockholders		27.72
equals: To retained earnings		0.0

Balance Sheets
1979
(millions)

Assets	Beginning		End		Liabilities	Beginning	End
Cash and other current assets		$100		$129.9	Accounts payable	$100	$100
					Long-term debt	277.2	277.2
Plant and equipment original cost	$900		$900		Net worth:		
less: unamortized subsidy	3			2.9	Capital stock	184.8	184.8
accrued depreciation	435	$462	465	$432.1			
Total assets		$562		$562.0	Total liabilities	$562.0	$562.0

Table 4
Net Rate Base, Income from Sales, and Cost of Service Elements, with 10 Percent Capital Subsidy; when Tax and Regulatory Income Measurement Rules are Identical

Year	Net rate base (beginning of year) (1)	Income from sales (2)	Cost of service				
			Cost of goods sold (3)	Net depreciation (4)	Interest paid (5)	Federal income tax (6)	Return to equity (7)
			(millions)				
Base case with subsidy:	$465.00	$274.57	$165.00	$30.00	$27.90	$23.77	$27.90
1979	$462.00	$273.95	$165.00	$29.90	$27.72	$23.61	$27.72
1980	459.10	273.36	165.00	29.80	27.55	23.47	27.55
1981	456.30	272.78	165.00	29.70	27.38	23.32	27.38
1982	453.60	272.22	165.00	29.60	27.22	23.18	27.22
1983	451.00	271.67	165.00	29.50	27.06	23.05	27.06
1984	448.50	271.14	165.00	29.40	26.91	22.92	26.91
1985	446.10	270.63	165.00	29.30	26.77	22.80	26.77
1986	443.80	270.14	165.00	29.20	26.63	22.68	26.63
1987	441.60	269.66	165.00	29.10	26.50	22.57	26.50
1988	439.50	269.20	165.00	29.10	26.37	22.46	26.37
1989	437.50	268.76	165.00	28.90	26.25	22.36	26.25
1990	435.60	268.34	165.00	28.80	26.14	22.26	26.14
1991	433.80	267.93	165.00	28.70	26.03	22.17	26.03
1992	432.10	267.54	165.00	28.60	25.93	22.09	25.93
1993	430.50	267.16	165.00	28.50	25.83	22.00	25.83
1994	429.00	266.81	165.00	28.40	25.74	21.93	25.74
1995	427.60	266.47	165.00	28.30	25.66	21.86	25.66
1996	426.30	266.14	165.00	28.20	25.58	21.79	25.58
1997	425.10	265.84	165.00	28.10	25.51	21.73	25.51
1998	424.00	265.55	165.00	28.00	25.44	21.67	25.44
1999	423.00	265.28	165.00	27.90	25.38	21.62	25.38
2000	422.10	265.03	165.00	27.80	25.33	21.57	25.33
2001	421.30	264.79	165.00	27.70	25.28	21.53	25.28
2002	420.60	264.57	165.00	27.60	25.24	21.50	25.24
2003	420.00	264.37	165.00	27.50	25.20	21.47	25.20
2004	419.50	264.18	165.00	27.40	25.17	21.44	25.17
2005	419.10	264.01	165.00	27.30	25.15	21.42	25.15
2006	418.80	263.86	165.00	27.20	25.13	21.41	25.13
2007	418.60	263.73	165.00	27.10	25.12	21.40	25.12
2008	418.50	263.61	165.00	27.00	25.11	21.39	25.11
2009	418.50	263.61	165.00	27.00	25.11	21.39	25.11
2010							

Table 5
Financial Statements, When a Capital Subsidy
Is "Flowed-Through" to Equity

Income Statement
for year, 1979
(millions)

Income from sales		$269.01
less: Cost of goods sold		165.00
equals: Operating income		104.01
less: Depreciation	$30.0	
Interest paid	27.9	57.90
equals: Pre-tax income		$ 46.11
less: Provision for Federal income tax		21.21*
equals: After-tax corporate income		$ 24.90
plus: Capital subsidy		3.00
"Net" income		$ 27.90
less: Distribution to stockholders		27.90
equals: Addition to retained earnings		0.00

*Assumes tax accounting will ignore nonshareholder contribution to capital.

Balance Sheets
1979
(millions)

Assets	Beginning	End	Liabilities	Beginning	End
Cash and other current assets	$100	$130	Current liabilities (including taxes payable)	$100	$100
Plant and equipment original cost	$900	$900	Long-term debt	279	279
less: accrued depreciation	435 $465	465 $435	Net worth: Capital stock	186	186
Total assets	$565	$565	Total liabilities	$565	$565

Table 6
Schedule of Interest-free Loans Extended and Repaid:
1979 Vintage of Plant and Equipment

End of year	Depreciation Schedule: Proclaimed 1/ (1)	Depreciation Schedule: Norm 2/ (2)	Loan extended /(1)-(2)/x.46 (3)	End of year (4)	Proclaimed 1/ (5)	Norm 2/ (6)	Loan repaid /(6)-(5)/x.46 (7)
				(millions)			
1979	$ 2.4	$ 1.0	$0.644	1994	$0.9	$ 1.0	$0.046
1980	2.3	1.0	0.598	1995	0.8	1.0	0.092
1981	2.2	1.0	0.552	1996	0.7	1.0	0.138
1982	2.1	1.0	0.506	1997	0.6	1.0	0.184
1983	2.0	1.0	0.460	1998	0.5	1.0	0.230
1984	1.9	1.0	0.414	1999	0.4	1.0	0.276
1985	1.8	1.0	0.368	2000	0.3	1.0	0.322
1986	1.7	1.0	0.322	2001	0.2	1.0	0.368
1987	1.6	1.0	0.276	2002	0.1	1.0	0.414
1988	1.5	1.0	0.230	2003	0.0	1.0	0.460
1989	1.4	1.0	0.184	2004	0.0	1.0	0.460
1990	1.3	1.0	0.138	2005	0.0	1.0	0.460
1991	1.2	1.0	0.092	2006	0.0	1.0	0.460
1992	1.1	1.0	0.046	2007	0.0	1.0	0.460
1993	1.0	1.0	0.0	2008	0.0	1.0	0.460
Totals	$25.5	$15	$4.830		$4.5	$15	$4.830

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1/ The proclaimed schedule is based on sum-of-years' digits, for 24 years. Thus, the denominator for each year's fractional depreciation is 300. Then for 1979, the fraction for determining the schedular amount is 24/300, and this multiplied by $30 million yields $2.4 million. The amount for 1980 is 23/300 times $30 million, and so on through 24 years.

2/ The depreciation norm is based on 1/30 of $30 million each year.

Table 7

Privately Financed Rate Base, Income from Sales, and Cost of Service Elements, With Federal Interest-Free Loan Program

Year	Financing of rate base: Beginning of year private funds (1)	Financing of rate base: Zero interest loans at end of year: For given year (2)	Financing of rate base: Zero interest loans at end of year: Cumulative (3)	Income from sales (4)	Cost of service: Cost of goods sold (5)	Cost of service: Depreciation (6)	Cost of service: Interest (7)	Cost of service: Income taxes (8)	Cost of service: After-tax return to equity (9)
Base case	$465.000	-	-	$274.57	$165.00	$30.00	$27.90	$23.77	$27.90
With lending subsidy:									
1979	$465.000	$0.644	$0.644	$274.57	$165.00	$30.00	$27.90	$23.77	$27.90
1980	464.356	1.242	1.886	274.46			27.86	23.73	27.86
1981	463.114	1.794	3.680	274.24			27.79	23.67	27.79
1982	461.320	2.300	5.980	273.94			27.68	23.58	27.68
1983	459.020	2.760	8.740	273.54			27.54	23.46	27.54
1984	456.260	3.174	11.914	273.07			27.38	23.32	27.38
1985	453.086	3.542	15.456	272.53			27.19	23.16	27.19
1986	449.544	3.864	19.320	271.92			26.97	22.98	26.97
1987	445.680	4.140	23.460	271.26			26.74	22.78	26.74
1988	441.540	4.370	27.830	270.55			26.49	22.57	26.49
1989	437.170	4.554	32.384	269.80			26.23	22.34	26.23
1990	432.616	4.692	37.076	269.03			25.96	22.11	25.96
1991	427.924	4.784	41.860	268.22			25.68	21.87	25.68
1992	423.140	4.830	46.690	267.40			25.39	21.63	25.39
1993	418.310	4.830	51.520	266.58			25.10	21.38	25.10
1994	413.480	4.784	56.304	265.75			24.81	21.13	24.81
1995	408.696	4.692	60.996	264.93			24.52	20.89	24.52
1996	404.004	4.554	65.550	264.13			24.24	20.65	24.24
1997	399.450	4.370	69.920	263.35			23.97	20.42	23.97
1998	395.080	4.140	74.060	262.60			23.70	20.19	23.70
1999	390.940	3.864	77.924	261.89			23.46	19.98	23.46
2000	387.076	3.542	81.466	261.23			23.22	19.78	23.22
2001	383.534	3.174	84.640	260.63			23.01	19.60	23.01
2002	380.360	2.760	87.400	260.08			22.82	19.44	22.82
2003	377.600	2.300	89.700	259.61			22.66	19.30	22.66
2004	375.300	1.840	91.540	259.22			22.52	19.18	22.52
2005	373.460	1.380	92.920	258.90			22.41	19.09	22.41
2006	372.080	0.920	93.840	258.67			22.32	19.02	22.32
2007	371.160	0.460	94.300	258.51			22.27	18.97	22.27
2008	370.700	0.000	94.300	258.43			22.24	18.95	22.24
2009	370.700	0.000	94.300	258.43	$165.00	$30.00	22.24	18.95	22.24

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Table 8
Financial Statements, First Year of a
Federal Interest-free Loan Program Financed
Through the Tax System

Income Statement
for year 1979
(millions)

Income from sales		$274.57
less: Cost of goods sold		165.00
equals: Operating income		$109.57
less: Depreciation	$30	
Interest paid	27.90	57.90
equals: Pre-tax income		$ 51.67
less: Provision for Federal income tax:		
Accrued taxes payable	$23.13	
Deferred tax	0.64	23.77
equals: After-tax ("net") corporate income		$ 27.90
less: Distribution to stockholders		27.90
equals: Addition to retained earnings		$ 0.00

Balance Sheets
1979
(millions)

Assets	Beginning		End		Liabilities	Beginning	End
Cash and other current assets		$100		$130.64	Current liabilities	$100	$100.00
					Long-term debt	279	279.00
Plant and equipment acquisition cost	$900		$900		Deferred taxes	0	0.64
less: accrued depreciation	435	$465	465	$435	Net worth:		
					Capital stock	186	186.00
Total assets		$565		$565.64		$565	$565.64

Table 9

Comparison of Income from Sales, When Proceeds of Interest-Free Loans Are So Accounted For and When They Are "Flowed-Through" to Equity Income in the Year Received

Year	Income from sales: loan benefits distributed as earned: "normalize" (1)	Interest-free loans "flowed-through" to income					
		Income from sales (2)	Costs of service			Income taxes "paid" (6)	Net return to equity (7)
			Cost of goods sold (3)	Depreciation (4)	Interest (5)		
			(millions)				
Base case	$274.57	$274.57	$165.00	$30.00	$27.90	$23.77	$27.90
With loan subsidies:							
1979	$274.57	$273.37	$165.00	$30.00	$27.90	$22.57	$27.90
1980	274.46	272.27				21.47	
1981	274.24	271.24				20.44	
1982	273.94	270.31				19.51	
1983	273.54	269.46				18.66	
1984	273.07	268.69				17.89	
1985	272.53	268.01				17.21	
1986	271.92	267.41				16.61	
1987	271.26	266.90				16.10	
1988	270.55	266.47				15.67	
1989	269.80	266.13				15.33	
1990	269.03	265.88				15.08	
1991	268.22	265.71				14.91	
1992	267.40	265.62				14.82	
1993	266.58	265.62				14.82	
1994	265.75	265.71				14.91	
1995	264.93	265.88				15.08	
1996	264.13	266.13				15.33	
1997	263.35	266.47				15.67	
1998	262.60	266.90				16.10	
1999	261.89	267.41				16.61	
2000	261.23	268.01				17.21	
2001	260.63	268.69				17.89	
2002	260.08	269.46				18.66	
2003	259.61	270.31				19.51	
2004	259.22	271.16				20.36	
2005	258.90	272.01				21.21	
2006	258.67	272.86				22.06	
2007	258.51	273.71				22.91	
2008	258.43	274.57				23.77	
2009	258.43	274.57	$165.00	$30.00	$27.90	23.77	$27.90

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Table 10

Combined Effect of Investment Tax Credit
and Interest-Free Loan Program on Cost of Service
(millions)

Plant and equipment required to produce specified quantity and quality of service; "rate base," at market prices			$465.00
Rate base assets to be financed:			
Base case (without subsidies)			$465.00
After 10 percent investment credit fully effective			$397.11
Financing of rate base assets:			
Base case: Interest-bearing debt	$279.00		
Capital stock	186.00	$465.00	
After investment credit and interest-free loan program effective:			
Interest-bearing debt	$189.95		
Capital stock	$126.63	316.58	
Interest-free loans, "deferred taxes"	80.53	397.11	

Cost of Service

	Base case	Subsidies fully effective
Total cost of service	$274.57	$241.06
Cost of goods sold	165.00	165.00
Capital costs: Depreciation	30.00	25.62
Interest paid	27.90	18.99
Provision for Federal income tax	23.77	12.45*
After-corporate tax return to equity	27.90	18.99

*Includes coverage of $4.38 million in initial and supplementary investment credit, but no addition to "deferred taxes."